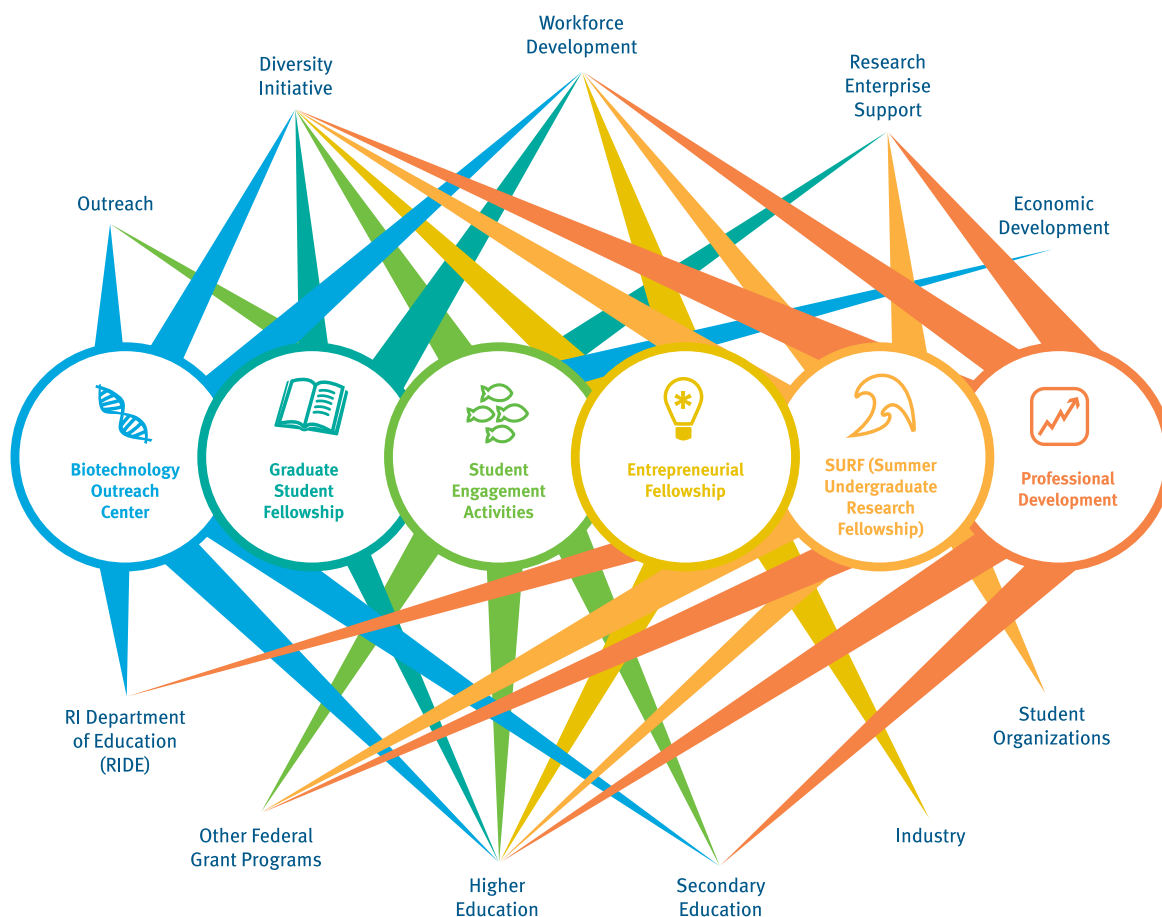


THE current

RESEARCH AND HAPPENINGS FROM RHODE ISLAND NSF EPSCoR | FALL 2009

Academy Issue



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RI NSF EPSCoR OUTREACH AND
COMMUNICATIONS COORDINATION

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On the Cover:

This image highlights the major activities of the RI NSF EPSCoR Academy over the past year and shows how each activity relates to the outreach, diversity, workforce development, economic development and the research goals of RI NSF EPSCoR. Types of partnerships involved are highlighted. Some of these relationships are described in this issue of *The Current*.

Greetings From The Directors

RI NSF EPSCoR DIRECTORS WELCOME

Greetings to another edition of *The Current*, the quarterly magazine of the RI NSF EPSCoR. Most likely you are aware of the significant challenges to the RI NSF EPSCoR program that have occurred recently, most notably the departure of the project director Dr. Jeffrey Seemann. Much of the credit for establishing the NSF EPSCoR program in Rhode Island goes to Dr. Seemann and we thank him for his efforts on our behalf. Second, the RI NSF EPSCoR proposal that would have continued the project for an additional five years was denied funding.

To address these challenges we have accomplished the following. First, a reconfigured leadership team has been put into place. Dr. Peter Alfonso, the URI vice president for research and economic development assumed the role as project director and Dr. Kenneth Payne serves as associate project director. There are now two co-directors. Dr. S. Bradley Moran, the URI assistant vice president for research administration and professor of oceanography, joins Dr. Edward Hawrot, Brown professor medical science, who served previously as co-director.

Second, we are well underway in preparing a proposal resubmission, which is entitled "Advancing Life Sciences in the Ocean State," to seek an additional five years of funding beginning August 1, 2010. Our efforts are guided by the very constructive feedback we received on the unfunded proposal. Most importantly, we are working collaboratively with all of the RI NSF EPSCoR institutions to craft a proposal that will best advance our important work in Rhode Island. The work is progressing very well and we are confident that we will have a competitive proposal in place to meet the October 19 submission deadline.

Third, we have been successful in obtaining NSF funding that will continue the current RI NSF EPSCoR program for an additional twelve months beginning August 1, 2009. With bridge funding of \$1.3 million, we will be able to continue most of the initiatives that were put forth in the first three-year funded program that ended in May, 2009. In a separate NSF EPSCoR initiative, namely the NSF cyberinfrastructure project, we were awarded \$1.2 million that will focus chiefly on establishing high speed broadband fiber to connect the URI Kingston and Narragansett Bay campuses to Providence and the northeast region.

About NSF



In 1978, the National Science Foundation founded the Experimental Program to Stimulate Competitive Research (EPSCoR). EPSCoR stimulates sustainable improvements in academic science and technology infrastructure in states that receive low levels of NSF research funds. These investments create a foundation for economic growth based on science and technology. Several other agencies have also developed EPSCoR or EPSCoR-like programs.

This is indeed a critical time for all of us involved in RI NSF EPSCoR where we address significant challenges not only to our EPSCoR program but also where we address significant challenges to our state. We are confident that we will be successful, and once again be in a position to play a major role in assisting our state to become truly competitive in a knowledge-based economy through STEM based education and workforce development, and by enhancing Rhode Island economic development that stems from our research programs.

Sincerely,



Dr. Peter Alfonso
RI NSF EPSCoR
Director
University of
Rhode Island



Dr. Edward Hawrot
RI NSF EPSCoR
Co-Director
Brown University



Dr. Bradley Moran
RI NSF EPSCoR
Co-Director
University of
Rhode Island



Dr. Kenneth Payne
RI NSF EPSCoR
Associate Director

RI NSF EPSCoR ACADEMY DIRECTOR WELCOME

As the director of the Rhode Island NSF EPSCoR Academy, it is my pleasure to welcome you to the education issue of *The Current*. The Academy is the umbrella organization that coordinates the human capital development programs in the EPSCoR portfolio. As such, it is home to a broad range of activities designed to address the workforce development, broader impacts, diversity, integration of research and education, and outreach components of the NSF EPSCoR mandate. A few of the programs and people who work with the Academy are highlighted in the following pages. Enjoy.



Dr. Andrew Staroscik
RI NSF EPSCoR Academy Director

About RI NSF EPSCoR

RI NSF EPSCoR's mission is to create lasting improvement in Rhode Island's research infrastructure by advancing statewide innovation through strengthening Rhode Island's basic science and engineering research capacity and addressing Rhode Island's workforce needs using enhancement of science and engineering training and education for students.

THE RI NSF EPSCoR ACADEMY

The RI NSF EPSCoR Academy fosters the integration of research, education, innovation and communication statewide. It works to (1) Develop the human capital necessary to support and sustain the growth of competitive research capacity in the life sciences (2) Broaden the participation of women and underrepresented

ethnic and racial minorities in the STEM workforce and (3) Develop and maintain sustainable communication mechanisms to build and enhance a strong statewide network of the state's and region's scientists, institutions of higher education, and private and public sectors.



Please join
RI NSF EPSCoR
in welcoming
Dr. Peter
Alfonso and
Dr. S. Bradley
Moran

to the leadership team.

Dr. Peter Alfonso is the vice president for research and economic development at the University of Rhode Island.

He has been awarded over \$20 million in federal research awards and has published over 130 book chapters, articles and abstracts in speech acoustics, perception and speech physiology throughout his research career.

Dr. S. Bradley Moran is the assistant vice president for research administration and professor of oceanography at URI. He has 20 years experience in oceanographic research, over \$16 million in total research funding, over 75 peer-reviewed publications, has participated in 50 research cruises and has initiated the development of the new "Blue MBA" Masters of Business Administration-Masters of Oceanography dual degree. Their experience and expertise will be extremely valuable to RI NSF EPSCoR in moving forward.

welcome

Educating a 21st Century Workforce: Vanessa Cooley

By: Sam Costello



Vanessa Cooley, RIDE

Building workforce capacity and enrollment in college and graduate programs in the science, technology, engineering, and math (STEM) disciplines is a key focus for RI NSF EPSCoR. But it's also well understood that interest must be sparked long before college to ensure that students are prepared for higher education or careers in science and technology-intensive industries.



That understanding served as part of the impetus for creating the Biotechnology Career and Technical Education Programs that help students in Rhode Island high schools prepare for education and jobs in the life sciences.

The programs guide students through a focused program of study in biotechnology throughout high school, according to Vanessa Cooley, coordinator of Statewide Career and Technical Education for the Rhode Island Dept. of Education (RIDE).

Students with interests and talents in career and technology programs are recruited to the programs in 8th grade. In 9th grade, they explore multiple areas of interest, giving them the exposure needed to select a focused course of study for 10th-12th grades.

Students enrolled in the programs take a traditional course load, with the biotech program of study treated as a focused group of electives, says Cooley. By graduation, students are prepared to enter college or the workforce in their chosen area.

The drive to prepare students for both college and work was born from the collaborative nature of the program's founding. The 2005 meetings to create the program included representatives of the Dept. of Education, Dept. of Labor and Training, University of Rhode Island (URI), Brown University, Community College of Rhode Island (CCRI), Rhode Island Tech Collective, business, and secondary schools.

Though the program drew from some existing high school programs, according to Cooley, involving business, industry, and postsecondary partners was key.

"We needed to make sure that the program was being designed to meet the needs of colleges in terms of admissions," she says, but the group also "wanted to make sure the kids would be work-ready, so we had to have business and industry at the table."

Five high schools — Davies Career and Technical in Lincoln, Exeter-West Greenwich Regional, the Wm. B. Cooley Science Technology High School, Mt. Hope in Bristol, and Burrillville High — began offering the program in 2007 and will graduate their first class in 2010. Woonsocket High School recently signed on and other schools, including Warwick Veterans, Chariho, and Coventry High Schools, have also expressed interest in offering the program.

Schools offering the program, however, is just part of this equation.

ENHANCING TEACHER TRAINING

In order for these programs to be effective, the teachers delivering them also need to be trained — and keeping teachers abreast of the rapid developments in research and industry can be a challenge.

"They need to have the most current information, standards, and materials," Cooley says, adding that teachers under the program get "training in biotech, which is evolving so quickly that it's essential that they be really at the top of the game."

“For economic development reasons, we need to make sure that our kids are going into areas of work that are current, that are growing, that are in our state.”

The Dept. of Education partnered with the URI Providence Biotechnology Center and CCRI to provide lab instruction to the teachers, giving them an understanding of the course materials and the tools to transfer that understanding to students.

It was in this teacher-training effort where RI NSF EPSCoR played its major role: funding the programs to equip teachers to deliver next-generation STEM education.

EPSCoR “brought money to the project which enabled us to recruit and train a lot of teachers,” Cooley notes.

To date, about 30 teachers have completed the full program; another 20 have taken some courses, Cooley says.

TO COLLEGE AND BEYOND

With so much invested in educating these students, keeping them local after graduation from high school is essential.

To that end, the schools established articulation agreements to help students gain automatic admission to local colleges and universities or enter with advanced standing that exempts them from some basic courses, Cooley says.

But success in college isn't the only measure of how effective the Biotechnology Career and Technical Education Programs are. Economic development is also key.

“For economic development reasons, we need to make sure that our kids are going into areas of work that are current, that are growing, that are in our state, so not only do they find jobs locally, we support the businesses in our state with a workforce,” says Cooley.

Thanks to this program, local students will be competitive in the global job market and boost Rhode Island's standing, too.

“The students who successfully complete these programs,” says Cooley, “will be able to go anywhere and compete with anyone.”

WHAT IS INQUIRY-BASED LEARNING?

The natural process of inquiry involves seeking information through questioning. As we move towards a knowledge economy, our workforce needs the skills to collaborate, solve problems and think innovatively. Knowing how to acquire, process and understand information is a critical skill — one that is developed through inquiry-based learning.

Inquiry-based learning is about how students learn, not what they learn. It is a student-centered approach in which teachers act as facilitators to guide students on their own path to knowledge discovery. Students are actively involved in the learning process, which leads to a deeper understanding of concepts and the development of an invaluable skill set.

Through inquiry-based activities, students develop the problem solving and critical thinking skills needed to participate in a knowledge economy. This approach encourages students to make observations, collect and analyze data, pose follow-up questions and draw their own conclusions — the same steps involved in scientific research.

Inquiry-based learning, though certainly applicable to science, can be used in a wide variety of disciplines and in everyday life — this is critical in a world where lifelong learning is increasingly important.

explainer



EPSCoR Academy Prepares Students, State for the Future

By: Sam Costello

There's no denying it: the economy is increasingly driven by science and technology.

From the most visible manifestations (computers and pharmaceuticals) to the more subtle (agribusiness and green building), science, technology, engineering, and math — collectively known as the STEM disciplines — are more essential to the economy than ever before.

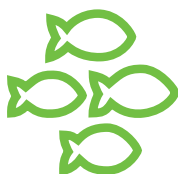
But if this is true, then the United States, and Rhode Island, have a problem.



Biotechnology
Outreach Center



Graduate
Student Fellowship



Student Engagement
Activities



Entrepreneurial
Fellowship



SURF (Summer
Undergraduate
Research Fellowship)



Professional
Development

“The enrollment of students in STEM disciplines is going down and declining enrollment has been identified as a risk to the nation losing its competitive edge due to that lack of a well-trained workforce,” says Andrew Staroscik, director of the RI NSF EPSCoR Academy.

He’s not the only one who sees a problem. In 2007, the National Science Foundation (NSF) wrote:

“The United States possesses the most innovative, technologically capable economy in the world, and yet its science, technology, engineering, and mathematics education system is failing to ensure that all American students receive the skills and knowledge required for success in the 21st century workforce.”

If STEM education is the problem, Rhode Island has a solution: the EPSCoR Academy.

CREATING THE ACADEMY

The RI NSF EPSCoR Academy was established as an integral facet of EPSCoR at the organization’s founding in 2006.

The Academy’s mandate is broad: work to help coordinate and support the programs and organizations addressing the Ocean State’s STEM issues; recruit and

nurture traditionally underrepresented populations; workforce development; and program development.

When the Academy was created, attention was only beginning to be focused on STEM issues at the state level. The Rhode Island Dept. of Education had made strides, but other initiatives — the STEM coordinator at the Economic Development Corporation, Rhode Island College’s STEM Center — were not yet in place, says Babette Allina, former associate project director of RI NSF EPSCoR.

The Academy “was designed so that all the human-capital development components of the RI NSF EPSCoR program would be centralized, integrated, and closely aligned with the research objectives of the program,” she says.

Even in Rhode Island, where geography and tight-knit professional communities make collaboration easier, a centralized organization like the Academy helps, adds Staroscik, who has led the Academy since mid-2008.

“The Academy is ... able to catalyze new collaborations and bring about higher-impact outcomes by getting groups of people to work together and coordinating resources,” he says.



Angela with her buckwheat soil chemistry plots



SURF students during Alternative Fuels Day



Afeez with his research setup

A RICH PROGRAM PORTFOLIO

The Academy's efforts to develop the STEM education infrastructure and student pipeline are supported by RI NSF EPSCoR's role in cross-sector collaboration. Some of these efforts include:

The Summer Undergraduate Research Fellowship, SURF, a 10-week summer program that has provided 55 Rhode Island undergraduates opportunities to conduct hands-on research, tour labs and businesses, and present research to colleagues. SURF is collaboration with the RI NIH IDeA Network for Biomedical Research Excellence (INBRE).

The recently launched Slater/EPSCoR Entrepreneurial Fellow Program unites EPSCoR, colleges and universities throughout Rhode Island and the Slater Technology Fund to "cultivate a culture of entrepreneurship in the scientific and engineering communities," according to Staroscik.

The program provides students the opportunity to work with science-based businesses. The goal is to spur participants to "bring that mindset of commercialization of scientific innovations into whatever they do next," Staroscik says.

For more on the program, see the spotlight on John Luo (page 10).

The Rhode Island Dept. of Education's Biotechnology Career and Technical Education Programs, which help spark interest in STEM disciplines in high school students (more in the focus on Vanessa Cooley, page 4).

This program, which also involves Community College of Rhode Island (CCRI) and University of Rhode Island (URI) prepares high school students for college and work by providing a three-year science-focused curriculum. The program includes training to equip teachers to deliver this crucial curriculum.

ENGAGING DIVERSE POPULATIONS

The Academy specifically emphasizes increasing the participation of traditionally underrepresented groups in STEM programs.

"Engaging the full breadth of the (local) population is essential," not just the traditionally represented populations, says Staroscik. This includes helping educators identify promising students who may need additional support.

"If (students) have the potential and their potential is not being realized, therein lies opportunity," he says.

Staroscik notes that programs in other states serving minority students have demonstrated increased student success and retention by offering non-academic support, close mentoring, and research opportunities. He hopes that the Academy can help expand similar efforts locally.

A BRIGHT FUTURE

With abundant local resources — from Narragansett Bay to educational and business facilities to the state's wealth of human capital — Rhode Island is positioned for growth, according to Staroscik.

"Life sciences is a very significant area of potential growth for Rhode island," he says. "The knowledge-based innovation economy envisioned by many people in the state (is) a potential catalyst" for significant economic and industrial development.

While RI NSF EPSCoR helps lay the foundation for this development among researchers and businesses, the EPSCoR Academy is training the next generation of scientists and life-science workers, ensuring that Rhode Island has a workforce prepared for the opportunities the future holds.

For more information on Academy activities, contact Dr. Andrew Staroscik, amstar@uri.edu

RITES —The Right Approach to Secondary Education



Rhode Island recognizes that in an innovation economy a solid foundation in science, technology, engineering and mathematics (STEM) is critical for all students to be successful in academics and in the workforce.

Low student achievement in math correlates with low achievement in the sciences. Student performance in science is unacceptably low in Rhode Island, and is compounded by a large demographic gap. In response, the state has made creating an accessible, comprehensive science curriculum a high priority.

Recently URI received \$12.5 million dollars from the National Science Foundation to fund the Rhode Island Technology Enhanced Science (RITES) program. This program's goal is to improve middle and high school education in the STEM fields, and to move schools towards achieving these statewide goals.

RITES is a multi-institutional partnership whose goal is also to increase the number and diversity of students achieving proficiency in science and pursuing STEM careers. The leadership team consists of scientists and educators, including PI's Daniel Murray of URI and Glenisson de Oliveira of RIC. It also includes Co-PI's Kathryn Crowley, the assistant superintendent of the Johnston School District, Peter McLaren, from the Rhode Island Dept. of Education, and Robert Tinker, the founder of the Concord Consortium (a science-education research organization).

RITES plans to reach 75% of all middle- and high-school science teachers in the state with unique teacher preparation and online resources that meet state standards for science and math. More significantly, RITES will also create a STEM "culture" within the state, whereby all stakeholders (students, parents, teachers and others) work together to foster a STEM-friendly climate. This effort will be documented to provide a template for similar efforts elsewhere in the country.

Planning will occur by pairing a high school and "feeder" middle school to develop a comprehensive science action plan. Participating teachers will take short courses developed by RITES and upon completion receive graduate credit, a stipend and an allowance for classroom implementation.

In addition to innovative professional development, RITES will also develop a sustainable online community for free interactive materials and ongoing communication. These materials will be designed for a range of classrooms — from one computer per class to one computer per student — making them accessible to all students in Rhode Island.

Students learn important concepts earlier and more thoroughly using computer tools with guided interaction, particularly in STEM. RITES' use of technology on the statewide scale is unprecedented for learning, assessment, community building and research. The collection of materials will provide inquiry-based learning experiences backed by automated progress for easy tracking (for more on inquiry-based learning see the explainer, page 5).

The proximity of institutions of higher education and K-12 schools in Rhode Island provides great opportunities for collaboration. All students will benefit from RITES' leveraging of available resources, especially the alignment of teacher training programs with partner institutions. RITES is aligning its efforts with RI NSF EPSCoR and other statewide programs, including several focusing on teacher diversity and the new STEM Center at Rhode Island College.

The combination of RITES' use of best practices in science education reform, its innovative use of cyberinfrastructure and collaboration with successful programs like RI NSF EPSCoR will certainly make a positive impact on STEM education in Rhode Island.

spotlight

Future Entrepreneur Out to Advance Rhode Island

John Luo, a Brown University graduate, is one of seven students who participated in the first Slater/EPSCoR Entrepreneurial Fellowship (SEEF) Program.



The SEEF Program provides entrepreneurs-in-training the tools they need to create “a rich foundation for new ventures, thus creating more jobs, revenue, and increasing the quality of life for Rhode Islanders,” Luo says.

That rich foundation cultivated in these young entrepreneurs is also found in the state itself. Rhode Island has the components for a strong biotechnology industry: world-class institutions, research facilities, and most importantly, talented people. Entrepreneurship is the vehicle by which the state can realize its potential in these areas.

The SEEF program is “an excellent way to build bridges between students, nearby institutions, and biotech entrepreneurship ventures in Rhode Island,” Luo says.

SEEF’s emphasis on collaboration was among the most important things Luo learned in the program.

“Fundamentally, we learned about the importance of teamwork,” he says. “I know it seems cliché, but it’s something that can’t be taught. In school, we often work individually on tests, homework, and papers. However, in the workforce, we have to interact with other people.”

The Slater staff was “phenomenal in sharing their experiences of being an entrepreneur, setting our teams up with projects, and taking the time to analyze our projects with us,” says Luo.

The SEEF program engages students in life science and biotechnology entrepreneurship as a way to cultivate a culture of entrepreneurship within the state’s life science research community. Fellows learned that the “proper execution of an idea is often more important than the idea itself,” says Luo.

Born in China, Luo’s heritage has inspired an interest in alternative medicine. As an undergraduate, he studied Commerce, Organizations, and Entrepreneurship — a concentration combining sociology, business engineering, and economics.

“It is the closest thing to a business program at Brown and the long name always makes people curious,” he says with a smile.

He also has a background in endocrinology and orthopedic research. This fall, he starts Brown Medical School and will continue to work on projects through Slater.

“I’ll be in Rhode Island for four years and hopefully more.”

To Luo, “entrepreneurship is more of a state of mind. In this sense, I hope to forever continue a path of entrepreneurship. The task of starting new ventures is always on my to-do list.”



John Luo at the Slater Technology Fund in Providence



2009 Entrepreneurial Fellows

SEEF is a unique, comprehensive experience that allows fellows to work on projects from the perspective

of a venture capitalist, scientist, and business consultant. This year, participating companies included a nano-particle orthopedics company, an adult stem-cell diabetes company, an embolics company, and a wound-healing company.

This diversity of experience — in terms of job role and type of company — is a key benefit of the program, says Luo.

“Most internship opportunities only allow interns to view certain parts of the business, but the venture-capital model encompasses all components of the business and really allowed [the fellows] to see how the pieces work together.”

Building Networks & Enhancing Collaboration

The RI NSF EPSCoR Academy sponsored a diversity workshop in April 2009 to bring together a variety of interested parties in order to coordinate efforts and seek advice about the trajectory of The Academy's diversity initiative.



Top left: Participants in café discussions for best practices
Top right: Ben, a current undergraduate offers his insights
Bottom center: Participants define their roles in the next steps

Workshop participants included administrators, faculty and students from Brown University, the University of Rhode Island and the Community College of Rhode Island, public and charter school administrators, representatives from state government, community groups and administrators of education and outreach programs from across the state. The program included a panel discussion moderated by Dr. Vanessa Quianoo, associate professor of Communication Studies and the interim director of the African and African American Studies program at URI.

Earl N. Smith III of the College of Arts & Sciences at URI talked about "Pathways to Freedom". Catalina Martinez of the NOAA Office of Ocean Exploration & Research discussed barriers, attractors and issues facing underrepresented and underserved students. The Executive Director of High Schools, Providence Public Schools, Nkolika Etell Onye talked about best practices from her district, advanced placement courses and college preparation for students of the STEM disciplines.

Donald Stanford of GTECH Corporation asked "How do we light the fire?" Richard Harris, director of Multicultural Engineering at Northeastern University, talked about bridging the gap to academic success.

Café discussions were held to allow for more inclusive dialogue about the critical issues raised by the panel. Common threads that were hit upon in multiple cafés included empowering parents and training teachers to work more closely with their students' families. Experiential learning at all education levels was stressed. The need for funding is always an issue and some innovative ideas were brought up, such as encouraging more private donors to invest in minority students through the support of research opportunities and externships. Development of more connections with industry was also identified as a critical component for the expansion of student opportunities.

Students currently enrolled at URI were invited to participate in the workshop and they added valuable insights. Their feedback included

the need for strong, relevant role models and more support and advising. They also reminded the group that support is more than academic, it is also emotional and social. Their comments reinforced the importance of the recruitment and retention of diverse faculty.

Throughout the workshop, participants were encouraged to make connections and identify actionable ideas for improving recruitment and retention of students in STEM disciplines. Recommendations included institutionalizing the role of a diversity coordinator and exploring the use of social media networking to connect to students.

The day ended with a discussion about how to keep the RI NSF EPSCoR diversity initiative moving forward. Identified next steps included the establishment an RI NSF EPSCoR diversity advisory council, the development of an online community to facilitate continued communication and plans for two follow-up meetings in the fall — one for this larger planning group and one specifically for students.



The Current is created with paper manufactured with windpower and containing 15% PCW.



If you would like to receive *The Current* electronically, please contact smacsorley@mail.uri.edu.



Rhode Island's collaborative research network is represented by the state's two standing governance and advisory committees:

RI Science and Technology Advisory Council (STAC) provides oversight and governance for the program. Its government-appointed membership includes key leadership from government, local industry and institutions of higher learning. STAC ensures that RI NSF EPSCoR-funded programs are integrated and aligned with the state's research infrastructure and economic development objectives.

RI NSF EPSCoR Advisory Council serves in an advisory capacity to the RI NSF EPSCoR program and STAC. The Council is composed of individuals representing Rhode Island institutions of higher education who have expertise in life-science research, K-16 education initiatives and workforce development.

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Rhode Island College

Dr. David Bogen
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Rhode Island School of Design

Dr. John Costello
Department of Biology,
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Dr. Lonnie Guralnick
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